AMENDMENTS TO THE CLAIMS

1. (Original) A method of generating a representation of the compositional distribution of a chemical sample as a function of depth, comprising:

irradiating the sample with radiation having a plurality of frequencies in the range from 25GHz to 1OOTHz;

detecting radiation reflected from and/or transmitted by said sample to obtain a time domain waveform;

obtaining frequency data as a function of time from the time domain waveform;

deriving the representation from the frequency data.

2. (Original) A method of generating a representation of the granularity of a chemical sample as a function of depth, comprising:

irradiating the sample with radiation having a plurality of frequencies in the range from 25GHz to 1OOTHz;

detecting radiation reflected from and/or transmitted by said sample to obtain a time domain waveform;

obtaining frequency data as a function of time from the time domain waveform;

deriving the representation from the frequency data.

3. (Currently amended) The method according to claim 1 ~~any preceding claim~~ wherein the sample is a pharmaceutical sample.

4. (Currently amended) The method of claim 1 ~~any preceding claim~~ wherein frequency data as a function of time is obtained from the time domain waveform using a Gabor transform.

5. (Original) The method of claim 4 wherein the Gabor transform is implemented using a windowed Fourier transform, a correlation of a specific kernel function or a filter-bank.

6. (Currently amended) The method of claim 4 ~~or 5~~ further comprising applying the Gabor function to the time domain waveform and selecting frequency, window type and/or window width of the Gabor function to optimise spectral or temporal features.

7. (Currently amended) The method according to any preceding claim wherein the compositional distribution representation is a three dimensional representation.

8. (Currently amended) The method according to claim 1 ~~any preceding claim~~ further comprising:

subdividing the sample to be imaged into a two-dimensional array of pixels,

detecting radiation from each pixel; obtaining a time domain waveform for each pixels; and

obtaining frequency data as a function of time for each pixel from the respective time domain waveforms;

deriving a representation as a function of depth at each pixel from the respective frequency data; and

combining the representations for each pixel into a three dimensional compositional distribution representation for the sample.

9. (Currently amended) The method according to claim 1 ~~any preceding claim~~ further comprising:

subdividing the sample to be imaged into a two-dimensional array of pixels,

detecting radiation from each pixel;

obtaining frequency data as a function of time for each pixel from the respective time domain waveforms;

deriving a cross-sectional compositional representation from the respective frequency data.

10. (Currently amended) The method of claim 1 ~~any preceding claim~~ wherein the radiation is pulsed.

11. (Original) An apparatus for creating a three dimensional compositional distribution representation of a chemical sample, the apparatus comprising:

emitter for irradiating the sample with radiation having a frequency in the range from 25GHz to 100THz;

detector for detecting radiation reflected from and/or transmitted by the sample at a plurality of pixels and producing a time domain waveform for each pixel;

means for obtaining frequency data as a function of time from the time domain waveform for each pixel;

means for deriving a compositional representation as a function of depth from the frequency data for each pixel; and

means for combining the representations for each pixel to generate the three dimensional compositional distribution representation.

12. (Original) The apparatus of claim 11 wherein the sample is a pharmaceutical sample.

13. (Currently amended) The apparatus of claim 11 ~~or 12~~ wherein the means for obtaining frequency data obtains the frequency data by applying a Gabor transform to the time domain waveform for each pixel.

14. (Currently amended) The method according to claim 1 ~~any one of claims 1 to 10~~ as used in a pharmaceutical manufacturing process.